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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/817,580

04/02/2004

Ming-Ren Chi

JCLA12583

2591

7590

12/02/2005

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT

PAPER NUMBER

2841

DATE MAILED: 12/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/817,580	CHI ET AL.	
	Examiner	Art Unit	
	Ishwar (I. B.) Patel	2841	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 November 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 7 and 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-14 and 16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election of specie "I", reading on figure 3B, claims 1-6, 8-14 and 16, in the reply filed on November 14, 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Also, acknowledged is the receipt of the priority documents, which papers have been placed of record in the file.

Drawings

3. The drawings are objected to because the figures are improperly cross hatched. All of the parts shown in section, and only those parts, must be cross-hatched. The cross-hatching patterns should be selected from those shown on page 600-114/115 of the MPEP based on the material of the part. See also 37 CFR 1.84(h)(3) and MPEP § 608.02.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-6, 8-14 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al., US Patent No. 6,521,997 (Huang) in view of Mencik et al., US Patent No. 5,163,605 (Mencik).

Regarding claim 1, Huang in figure 1-3 discloses a circuit carrier, comprising a substrate (10) having a surface, said surface having a passive component connecting

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area (see figure 3, area for mounting passive component 15); a patterned circuit layer (column 3, line 11-13) on said surface of said substrate, said patterned circuit layer having at least a set of passive component electrode pads (12) on said passive component connecting area, said set of passive component electrode pads including a first passive component electrode pad (one of the pads 12) and a second passive component electrode pad (the other of the pads 12); and a solder mask layer (11) covering said surface of said substrate, said solder mask layer including at least a set of solder mask openings (opening exposing the pads 12 and recess 13), said set of solder mask openings including a first solder mask opening, a second solder mask opening, and a third solder mask opening, said first solder mask opening and said second solder mask opening exposing said first passive component electrode pad (opening exposing the first passive component electrode pad 12, figure 1) and said second passive component electrode pad (opening exposing second passive component electrode pads 12, figure 1) respectively, said third solder mask opening having a length direction (13, see figure 1), said third solder mask opening along said length direction being divided into a central area (central area of recess 13), a first extension area (extension on first side of the central area), and a second extension area (extension on the other side of the central area), said central area being between said first and said second solder mask openings (see figure 1), said first extension area and said second extension area extending from said central area along said length direction to two sides respectively (see figure 1).

Huang does not disclose the width of said central area being smaller than the width of said first extension area. However, Huang further states that the recessed portion can be made of any suitable area without being particularly limited, (column 3, line 24-25). Huang further states that the recess will facilitate proper filling of encapsulating material and avoid bridging (column 3, line 40-60).

Mencik, in figure 3 and 4, disclose a component (50) mounted on a circuit board and with larger area of solder mask removed from the area beneath the component, shown by outline 90, to facilitate removal of debris from underneath component (column 2, line 60-65).

A person of ordinary skill in the art would have been motivated to select an area, which will facilitate proper filling of the encapsulating material, avoid bridging, and to allow removal of debris from underneath the component. Further, it has been held that more than a mere change in the shape is necessary for patentability. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the carrier of Huang with said central area being smaller than the width of said first extension area, as taught by Mencik, in order to have the recess to facilitate proper filling of the encapsulating material, to avoid bridging and also to facilitate debris removal.

Regarding claim 2, Huang further discloses said circuit carrier is an IC package substrate (column 3, line 5-10).

Regarding claim 3, Huang further discloses said surface of said circuit carrier includes a top surface and a bottom surface corresponding to said top surface (see figure 2).

Regarding claim 4, 5 and 6, the Huang discloses all the features of the claimed invention including the opening in the mask between the openings for two passive component electrode pad area, as applied to claim 1 above. Huang does not disclose the widths of said first and second extension areas increase gradually from said central area along said length direction, as claimed in claim 4, the shape of each said first and second extension areas is a trapezoid, and the shorter side of each of said trapezoid is connected to one side of said central area along said length direction, as claimed in claim 5 and the width of said first extension areas increases gradually from said central area along said length direction, as claimed in claim 6. However, as further stated by Huang and as applied to claim 1 above, any suitable shape for the opening (recess 13) will be selected without being particularly limited (column 3, line 24-25) to facilitate proper filling of the encapsulating material and also avoid bridging. Further, Mencik, in figure 3 and 4, disclose a component (50) mounted on a circuit board and with larger area of solder mask removed from the area beneath the component, shown by outline 90, to facilitate removal of debris from underneath component (column 2, line 60-65).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified carrier of Huang with the widths

of said first and second extension areas increase gradually from said central area along said length direction, as claimed in claim 4, the shape of each said first and second extension areas is a trapezoid, and the shorter side of each of said trapezoid is connected to one side of said central area along said length direction, as claimed in claim 5, and the width of said first extension areas increases gradually from said central area along said length direction, as claimed in claim 6, in order to facilitate proper filling of the encapsulating material and also avoid bridging to facilitate removal of debris from underneath component.

Regarding claim 8, Huang in figure 1-3 discloses package structure, comprising a circuit carrier (1), said circuit carrier including a substrate (10) having a surface, said surface having a passive component connecting area (see figure 3, area for mounting passive component 15); a patterned circuit layer (column 3, line 11-13) on said surface of said substrate, said patterned circuit layer having at least a set of passive component electrode pads (12) on said passive component connecting area, said set of passive component electrode pads including a first passive component electrode pad (one of the pads 12) and a second passive component electrode pad (the other of the pads 12); and a solder mask layer (11) covering said surface of said substrate, said solder mask layer including at least a set of solder mask openings (opening exposing the pads 12 and recess 13), said set of solder mask openings including a first solder mask opening, a second solder mask opening, and a third solder mask opening, said first solder mask opening and said second solder mask opening exposing said first passive component

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electrode pad (opening exposing the first passive component electrode pad 12, figure 1) and said second passive component electrode pad (opening exposing second passive component electrode pads 12, figure 1) respectively, said third solder mask opening having a length direction (13, see figure 1), said third solder mask opening along said length direction being divided into a central area (central area of recess 13), a first extension area (extension on first side of the central area), and a second extension area (extension on the other side of the central area), said central area being between said first and said second solder mask openings (see figure 1), said first extension area and said second extension area extending from said central area along said length direction to two sides respectively (see figure 1) and at least a passive component (15) having a first electrode (150) and a second electrode (151), said first electrode and said second electrode being soldered (column 3, line 30-35) to said first passive component electrode pad and said second passive component electrode pad respectively.

Huang does not disclose the width of said central area being smaller than the width of said first extension area. However, Huang further states that the recessed portion can be made of any suitable area without being particularly limited, (column 3, line 24-25). Huang further states that the recess will facilitate proper filling of encapsulating material and avoid bridging (column 3, line 40-60).

Mencik, in figure 3 and 4, disclose a component (50) mounted on a circuit board and with larger area of solder mask removed from the area beneath the component, shown by outline 90, to facilitate removal of debris from underneath component (column 2, line 60-65).

A person of ordinary skill in the art would have been motivated to select an area, which will facilitate proper filling of the encapsulating material and also avoid bridging and also to allow removal of debris from underneath the component. Further, it has been held that more than a mere change in the shape is necessary for patentability. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the carrier of Huang with said central area being smaller than the width of said first extension area, as taught by Mencik, in order to have the recess to facilitate proper filling of the encapsulating material, to avoid bridging and also to facilitate debris removal.

Regarding claim 9, the modified carrier of Huang further discloses an encapsulant (17) covering said passive component.

Regarding claim 10, the modified carrier of Huang further discloses said circuit carrier is an IC package substrate (column 3, line 5-10).

Regarding claim 11, the modified carrier of Huang further discloses said surface of said circuit carrier includes a top surface and a bottom surface corresponding to said top surface (see figure 2).

Regarding claim 12, 13 and 14, the Huang discloses all the features of the claimed invention including the opening in the mask between the openings for two passive component electrode pad area, as applied to claim 1 above. Huang does not disclose the widths of said first and second extension areas increase gradually from said central area along said length direction, as claimed in claim 12, the shape of each said first and second extension areas is a trapezoid, and the shorter side of each of said trapezoid is connected to one side of said central area along said length direction, as claimed in claim 13 and said first extension areas increases gradually from said central area along said length direction, as claimed in claim 14. However, as further stated by Huang and as applied to claim 1 above, any suitable shape for the opening (recess 13) will be selected without being particularly limited (column 3, line 24-25) to facilitate proper filling of the encapsulating material and also avoid bridging. Further, Mencik, in figure 3 and 4, disclose a component (50) mounted on a circuit board and with larger area of solder mask removed from the area beneath the component, shown by outline 90, to facilitate removal of debris from underneath component (column 2, line 60-65).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of applicant's invention to provide the modified carrier of Huang with the widths of said first and second extension areas increase gradually from said central area along said length direction, as claimed in claim 12, the shape of each said first and second extension areas is a trapezoid, and the shorter side of each of said trapezoid is connected to one side of said central area along said length direction, as claimed in claim 13, and said first extension areas increases gradually from said central area along

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said length direction, as claimed in claim 14, in order to facilitate proper filling of the encapsulating material and also avoid bridging to facilitate removal of debris from underneath component.

Regarding claim 16, the Huang discloses said passive component is a resistor, a capacitor, or an inductor (column 1, line 12-15).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Chuang et al., US Patent No. 6,673,690, in figure 4B, discloses a passive component mounted over an integrated circuit package substrate.

Shirasaki et al., US Patent No. 5,378,859, discloses, in figure 1A, discloses a chip mounting wiring board (21) with mask (protective film 25) removed which will provide a large area to facilitate filling of sealing compound after removing the flux (column 5, line 12-18).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Ishwar (I. B.) Patel
Examiner
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November 26, 2005